

U.S. Patent Application Serial No. 10/791,787
Amendment filed August 14, 2006
Reply to OA dated March 14, 2006

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A micro-oscillation element comprising:
 - 2 an oscillation section;
 - 3 a main frame; [[and]]
at least one torsion bar connecting the oscillation section to the main frame for defining an oscillation axis about which the oscillation section pivotally oscillates relative to the main frame;
6 and
7 a first spring and a second spring that cause the oscillation section to be supported by the frame;
9 wherein the oscillation section is located between the first spring and the second spring, each of the first spring and the second spring being deformable ~~along with in~~
10 response to oscillation of the oscillation section about the oscillation axis; and
12 wherein the torsion bar is connected to a first portion of the oscillation section at
13 which the oscillation axis passes, each of the first and second springs being connected to a
14 second portion of the oscillation section that is located away from the oscillation axis.

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1 Claim 2 (Original): The micro-oscillation element according to claim 1, further comprising:
2 a first actuating section connected to the frame via the first spring; a second actuating section
3 connected to the frame via the second spring; a first thin section connecting the oscillation section
4 and the first actuating section; and a second thin section connecting the oscillation section and the
5 second actuating section;

6 wherein the first and the second actuating sections are located between the first and
7 the second springs, the oscillation section being located between the first and the second
8 actuating sections, each of the first and the second actuating sections being movable in
9 moving directions of the oscillation section, the first spring being deflectable as the first
10 actuating section is displaced, the second spring being deflectable as the second actuating
11 section is displaced.

1 Claim 3 (Original): The micro-oscillation element according to claim 1, wherein the
2 first and the second springs are plate springs.

Claim 4 (Canceled).

1 Claim 5 (Currently Amended): The micro-oscillation element according to claim
2 [[4]] 1, wherein the torsion bar has a cross-shape in a cross-section orthogonal to the
3 oscillation axis.

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1 Claim 6 (Currently Amended): The micro-oscillation element according to claim
2 [[4]] 1, wherein at least one of the first spring, the second spring and the torsion bar is
3 formed with at least one hole.

1 Claim 7 (Currently Amended): The micro-oscillation element according to claim
2 [[4]] 1, wherein at least one of the first spring, the second spring and the torsion bar has a
3 nonconstant width.

1 Claim 8 (Currently Amended): The micro-oscillation element according to claim
2 [[4]] 1, wherein at least one of the first spring, the second spring and the torsion bar has a
3 nonconstant thickness.

Claims 9 and 10 (Canceled).

1 Claim 11 (Original): The micro-oscillation element according to claim 1, further comprising
2 an actuator for generating a driving force causing oscillation of the oscillation section.

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1 Claim 12 (Original): The micro-oscillation element according to claim 11, wherein a
2 difference between a frequency of the driving force generated by the actuator and a resonance
3 frequency of the oscillation of the oscillation section is 1% or less of the resonance frequency.

1 Claim 13 (Original): The micro-oscillation element according to claim 1, wherein the
2 oscillation section is provided with a mirror face for reflecting light.

1 Claim 14 (Original): The micro-oscillation element according to claim 1, further comprising:
2 a second frame disposed outward of the main frame; and third and fourth springs connecting the
3 second frame to the main frame;

4 wherein the main frame is located between the third spring and the fourth spring, each of the
5 third and the fourth springs being deformable along with oscillation of the main frame.

1 Claim 15 (Original): The micro-oscillation element according to claim 14, wherein a
2 direction in which the first and the second springs are spaced from each other intersects a direction
3 in which the third and the fourth springs are spaced from each other.

1 Claim 16 (Currently Amended): The micro-oscillation element according to claim 15,
2 further comprising: ~~at least one torsion bar defining a first oscillation axis of oscillation of the~~

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3 ~~oscillation section; and at least one torsion bar defining a second oscillation axis of oscillation of~~
4 about which the main frame oscillates relative to the second frame.

1 Claim 17 (Currently Amended): The micro-oscillation element according to claim 16,
2 wherein ~~the first oscillation axis and the second oscillation axis intersect intersects the oscillation~~
3 axis of the oscillation section.

1 Claim 18 (Currently Amended): The micro-oscillation element according to claim 17,
2 wherein ~~the first oscillation axis and the second oscillation axis intersect intersects each other the~~
3 oscillation axis of the oscillation section at 90°.

1 Claim 19 (New): The micro-oscillation element according to claim 1, each of the first and
2 second springs has width which is largest at a portion for connection to the frame and progressively
3 decreases toward the oscillation section.

1 Claim 20 (New): The micro-oscillation element according to claim 1, each of the first and
2 second springs is formed with at least one hole.

1 Claim 21 (New): The micro-oscillation element according to claim 1, each of the first and
2 second springs comprises at least two spring bars which are spaced from each other.

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1 Claim 22 (New): The micro-oscillation element according to claim 21, the spacing between
2 the spring bars is largest at a portion for connection to the frame and progressively reduces toward
3 the oscillation section.

1 Claim 23 (New): The micro-oscillation element according to claim 1, each of the first and
2 second springs has thickness which is larger at portions for connection to the frame and the
3 oscillation section, respectively, while being smaller at an intermediate portion between the frame
4 and the oscillation section.

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